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LIVE-STOCK GRAZING AS A FACTOR IN FIRE PROTECTION ON THE NATIONAL FORESTS

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PURPOSE.

Grazing has always been an acknowledged minor influence in fire protection. On the other hand, unregulated or uncontrolled grazing is destructive to Forest interests; and the injuries from grazing in the earlier days of unrestricted competition far outweighed the benefits. The possibility of planning grazing management so as to afford greater protection against fire calls for more constructive thought than has heretofore been given it. It must be recognized, however, that grazing may be made a benefit or a drawback in National Forest economy—that its value as a protective factor can be easily overdrawn. Great care must be taken not to destroy more than we protect. In recognizing the protective value of grazing we must not be led into condoning general injury to reproduction or other resources, which might be prevented, on the ground that the injury is more than compensated by the reduction in fire hazard. There is need, however, for constructive effort to use grazing in our National Forest fire-protection plans, especially at critical points. The tendency has been to follow the easier way of grazing a complete unit instead of concentrating on critical or strategic points.

The benefits of grazing may be summarized as follows:

- (1) Keeping fires from starting.
- (2) Keeping fires from spreading.
- (3) Rendering fires less destructive.

The drawbacks:

- (1) Injury to forest growth.
- (2) Injury to soil and water conditions.
- (3) Injury to range.

It is purposed here to call attention to some concrete examples of the beneficial results in fire protection of live-stock uses, to suggest methods for their more extensive application, and to stimulate fuller thought and closer observation on this subject. More concrete data are needed on the actual application of the protective features of grazing.

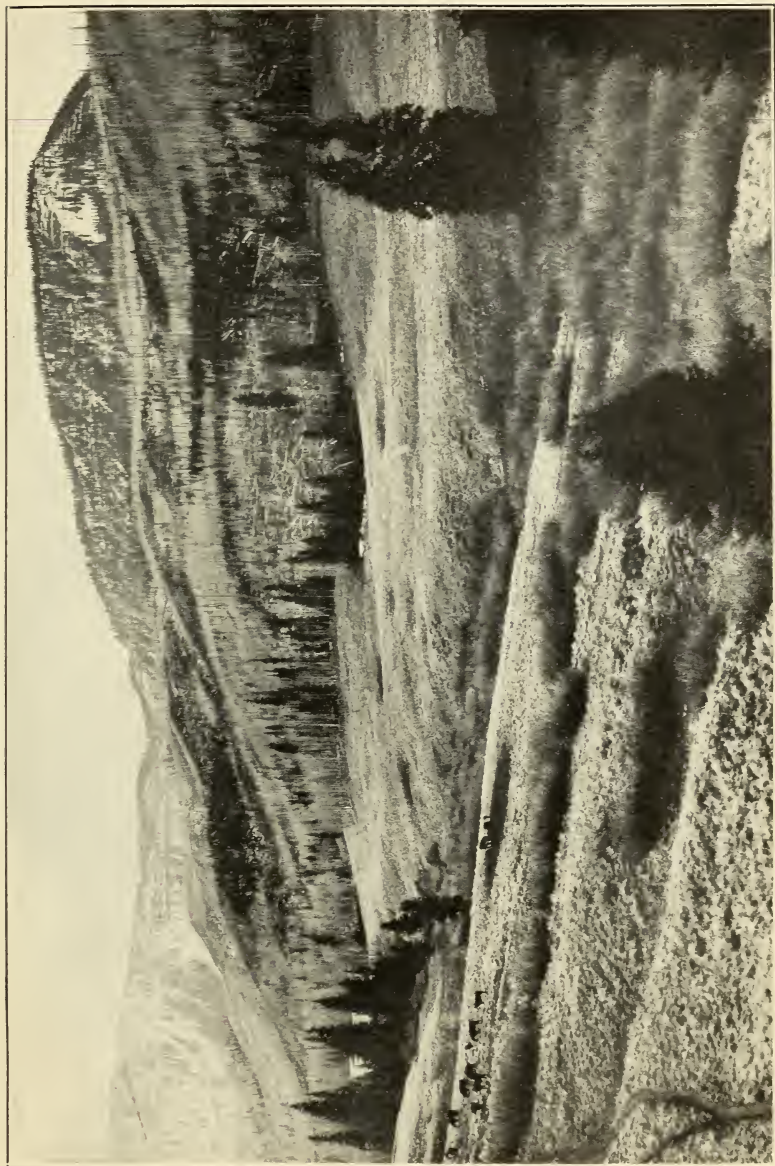
HISTORY.

In the year 1900, partly because mountain ranges were needed to support the stock industry of the West and partly because of the necessity for fuller knowledge upon which to base a definite grazing policy, the Department of the Interior called upon the Department of Agriculture to make a thorough study of the effect of grazing upon the most important Forest Reserves then existing, with a special request for reports on the relation of grazing to forest fires. Among the questions asked of the examiners were these:

- (1) Does grazing decrease or diminish the danger from fire?
- (2) Do herders or stockmen set fire to the forests to improve the range?
- (3) What is the effect of repeated burning upon the forest and upon the range?
- (4) How long a time should pass before burned range is grazed again in the forest and outside?
- (5) What is the relative effect of grazing before and after burning, on the grass, the forest, and the soil?

The investigation for the most part showed that the supposed setting of fires by stockmen to clear or improve the range had been much overdrawn; that the danger from this source and from carelessness on the part of stockmen had either disappeared or was rapidly disappearing; that burning was a harm instead of a benefit to forage conditions; and that grazing of different kinds of stock could be allowed in reasonable numbers under proper regulation without undue injury to forest and water resources. The reports also brought out very forcibly the harmful effects of uncontrolled grazing in the past.

A systematic attempt to reduce these general impressions to concrete statements, supported by specific examples, was inaugurated in the spring of 1912, and reports were received that season from 120 of the 160 Forests then existing. While some of these reports showed, for particular situations or conditions, that grazing had an indifferent influence, and a very small number showed unfavorable effects, the large majority were positive in the statement that grazing constituted an important factor in fire protection. Many concrete illustrations were furnished which strengthened the feeling, already existing, that, in the balance of beneficial and harmful effects, judicious grazing may be a certain asset in fire protection. The study also



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A PROPER GRAZING USE OF THE NATIONAL FORESTS, NOTE COW TRAILS WHICH ARE GOOD FIRE LINES.
COLORADO.



brought out the fact that different localities presented different problems and conditions, requiring different treatment, and that the same results from grazing did not necessarily follow in all places.

INFLUENCE OF GRAZING UPON THE NUMBER OF FIRES.

Of 120 Forests reporting in 1912, 81 per cent stated that the number of fires was reduced by the annual removal of the forage crop; 12.5 per cent reported to the contrary; the remainder made no statement. That fires are reduced in number by the annual removal of herbaceous growth should be axiomatic. The question is: "Does *normal grazing*—the sort of grazing that it is desired to carry out on the Forests—count as a protective influence worthy of consideration?"¹ The studies undertaken show that it does. By the removal of inflammable growth and the breaking up of dead and down litter, grazing has an appreciable influence in decreasing the number and spread of fires and in increasing the difficulties of incendiaryism. Records compiled from seven National Forests representing typical conditions in as many States show that grazing causes an average reduction in the number of fires of over 60 per cent—the percentages ranging from a minimum of 50 to a maximum of 75.

On the limited number of Forests where grazing is reported to be of doubtful advantage in heavy timber, the reports are based on the scarcity or complete lack of forage and the fact that stock occupy such areas very little, if at all. The favorable effects are especially marked on areas formerly visited by destructive fires. To illustrate: An instance is given where five years of grazing on the Deerlodge Forest, Mont., resulted in breaking down and wearing out over 50 per cent of the litter on a dangerous fire-trap area. Decaying logs which rot from the interior, as in the case of lodge-pole pine, have their outer shells broken by constant trampling of sheep, which thus hastens disintegration. The effects of cattle grazing are not so marked, since the tendency of cattle is to follow trails and to step over obstacles; but any kind of grazing shows positive results, depending upon the intensity of use and the adaptability of the area to grazing. Of course, grazing can not be used under all conditions. While 75 per cent of the National Forest area is being used or is susceptible of being used for grazing, and while 96 per cent of this area is clothed with some form of inflammable material, there are still many portions of the Forests on which, through inaccessibility or absence of suitable plant growth, it is impracticable to graze stock.

¹ By normal grazing is meant grazing only to such an extent that the forage crop does not decrease from year to year.

INFLUENCE OF GRAZING ON THE INTENSITY AND AREA OF FIRES.

Strictly accurate comparisons of the effects of grazing in reducing the intensity and area of fires must take into account any possible factors influencing them, such as origin, topography, character of cover, climatic conditions, time of day, and effectiveness of the protective organization. For instance, data collected on the Forests of the Cascade Mountains, Washington and Oregon, would not apply to conditions on the Forests east of that range.

On a well-stocked Forest, such as the Fremont in Oregon, which is comparatively level, with no abrupt changes in elevation or material differences in the character of the timber or forage cover, and on which the range is equally well adapted to cattle or sheep, comparisons are easily made. The average area burned per fire on sheep allotments here is 24 acres, on cattle and horse allotments 114, and on areas where lack of stock water reduces grazing to such an extent that they may be classed as ungrazed, 391 acres. On the basis of the fire season of 1910, the records showed the average acreage per fire on nongrazed lands was 273; on understocked, 300 (one fire only); on normally stocked, 15.07; and on overgrazed, 4 acres.

On the Beartooth National Forest, Mont., in 1910, two sections of ungrazed timberland were burned over before a fire could be controlled. In contrast to this, another fire in grazed country, under similar conditions, burned barely an acre, although it was not discovered promptly.

The Bridger Forest in Wyoming reports a fire on a cattle range which was reached 4 hours after discovery by 4 men and was put under control in 12 hours, burning only 10 acres, while a fire on similar ungrazed area, reached in 3 hours by 9 men, took 2½ days to extinguish and burned 90 acres. The second fire cost four and two-thirds times the first, burned nine times the area, and did nine times the damage.

The Shasta Forest, Calif., reports a fire that was stopped easily when it reached sheep area. Another instance is recorded on this Forest where duff and litter burned for 6 weeks and outlived a 3 days' rain, as against an instance on a grazed area, with more underbrush, where a fire burned out in 3 days. All the timber was killed in the first instance, while only a small amount was destroyed in the second.

LIGHTNING FIRES.

Next to carelessness and sparks from locomotives lightning ranks third as a source of conflagrations in the mountains. For the years 1906 to 1919, inclusive, lightning caused on the average 27 per cent of all fires reported.

Of 36 fires which occurred on one of the California Forests one season, 28 were caused by lightning. On the same Forest the preceding season 68 fires occurred, 21 of which were caused by lightning. Lightning starts fires most often along the summits of ridges, remote from settlements, where they are controlled with difficulty unless there is some deterrent factor, such as grazing or barren conditions. The time-worn theory that "lightning never strikes twice in the same place" may be modified to this extent: Lightning strikes very often in nearly the same places—it has its zones, in other words, where its appearance may usually be counted on with each electric storm. For the past 15-years, with the accumulation of data on causes and locations of fires, these lightning zones could be mapped out and possibly systems of grazing use introduced that would more or less automatically control fires at the start. If these lightning zones were mapped out, they would doubtless show a markedly close relation to certain types of topography and certain more or less localized sections of many Forests. If the hazard is large on account of heavy undergrowth or herbaceous cover, it might be feasible to introduce sheep grazing as a measure of control.

Instances are reported where lightning started 7 fires, 5 in country grazed by sheep and 2 outside, and the 5 on the sheep range needed no attention, while the 2 outside burned until handled by forest officers. This shows 71 per cent better control on grazed areas. An Oregon Forest reports instances where lightning fires have died out of their own accord on grazed areas. Another Forest in the same State cites a number of cases where trees have been fired by lightning and the fires extended only a few feet beyond their bases on grazed areas, while on similar areas ungrazed they spread rapidly. Similar reports are recorded from Idaho, Montana, Arizona, South Dakota, and other States. There is need for a closer study of lightning fires as they relate to certain types of topography or localized sections of the Forests with a view to closer application, if practicable, of grazing uses to fire control.

DRIVEWAYS AND TRAILS.

One of the most marked examples of the benefits of grazing use is in the effectiveness of stock driveways and trails in the control of fires after they have started. Few fires which gain any headway are controlled by direct attack. Advantage is taken of every available artificial and natural means of combating them. Many portions of the National Forests lack roads and trails, and while appropriations for these purposes have been much more liberal in recent years and their expenditure as much as possible is directed to the opening of sections of country which are inaccessible, or have the greatest fire hazard, it

will require years to complete the work. On such areas driveways and stock trails are especially useful in fire fighting.

Stock driveways are usually located along ridges or roads, thus furnishing the best lines of defense or attack. Their usefulness depends upon the kind of country traversed and their effectiveness upon the intensity of use. The wisest possible use should be made of them. And not only should those existing be employed but new ones should be laid out or old ones changed wherever advisable. If not fully efficient in actually stopping fires, they serve as excellent points from which to backfire.

The San Francisco fire in 1906 was stopped partly because it came to a broad fire line—Van Ness Avenue—a fire line comparable to many roads or trails or natural barriers in the National Forests. But Van Ness Avenue in itself was not an efficient barrier. Had it not been for the use of dynamite, which reduced inflammable material or rendered it less inflammable, much less of San Francisco would have been saved. The incident points to intensity of use of these features of the Forests to the point perhaps of local damage at strategic points of fire vantage.

The Wenaha Forest reports fires checked at least 50 per cent by driveways. The Gallatin Forest reports that in the case of a severe fire in 1910 a driveway was crossed only where the fire was burning in the crowns of the trees. Many other instances are recorded of the efficiency of driveways in preventing the spread of fires. Specific examples are graphically shown on the accompanying map of a portion of the Wenatchee Forest (fig. 1).

Trails made by live stock have also been found to contribute materially to fire protection in serving as fire lines and making areas more accessible. Of 250 fires reported on the Harney National Forest in three years, 75 per cent were checked by making use of roads and trails of different kinds.

On many National Forests practically all of the trails traveled, outside of a few main trails, have either been built by stockmen or opened up by live stock. They are frequently used as short cuts to get to fires and could well be tied in to the main roads and trails in connection with the fire plan. Driveways and trails should be located where they will give best fire service, although this may entail the sacrifice of some young growth.

ADDITIONAL PERSONS IN THE FORESTS.

Grazing necessarily brings a large number of people into the mountains to care for the stock—fully 25,000 persons. The presence of this additional population introduces a certain fire hazard. This was truer formerly than now, and the hazard at the present time, taking the Forests as a whole, is very small—almost negligible.



F-75463

FIG. 1.—HARMFUL EFFECTS OF OVERGRAZING BY GOATS TO REPRODUCTION AND SOIL COVER. NEW MEXICO.



F-24969

FIG. 2.—HARMFUL SHEEP GRAZING SHOWING DESTRUCTION OF SURFACE. CALIFORNIA.



F-91509

FIG. 1.—FIRE MENACE OF INFLAMMABLE GRASS ON NON-GRAZED FOREST AREA. OREGON.



F-77603A

FIG. 2.—FIRE MENACE IN FOOTHILL COUNTRY. CALIFORNIA.



F-93222

FIG. 1.—BREAKING UP LITTER AND MAKING FORESTS CLEANER. COLORADO.



F-45669

FIG. 2.—SHEEP HELP TO CLEAN UP OLD BURNS AND REDUCE FIRE HAZARD.



F-11624A

FIG. 1.—FIRE LINE DRIVEWAY 12¼ MILES LONG. PORTIONS PASS THROUGH HEAVY TIMBER. COLORADO.



F-90155

FIG. 2.—YELLOW PINE REPRODUCTION. THIS AREA WAS CONSERVATIVELY GRAZED BY SHEEP FOR 40 YEARS AND FIRES KEPT OUT. THE BALANCE IN FAVOR OF LIVESTOCK USES. CALIFORNIA.

This change in conditions may be attributed to (1) fire laws and regulations, (2) change in sentiment, (3) absence of range wars and disputes among stockmen, and (4) growing demands for range.

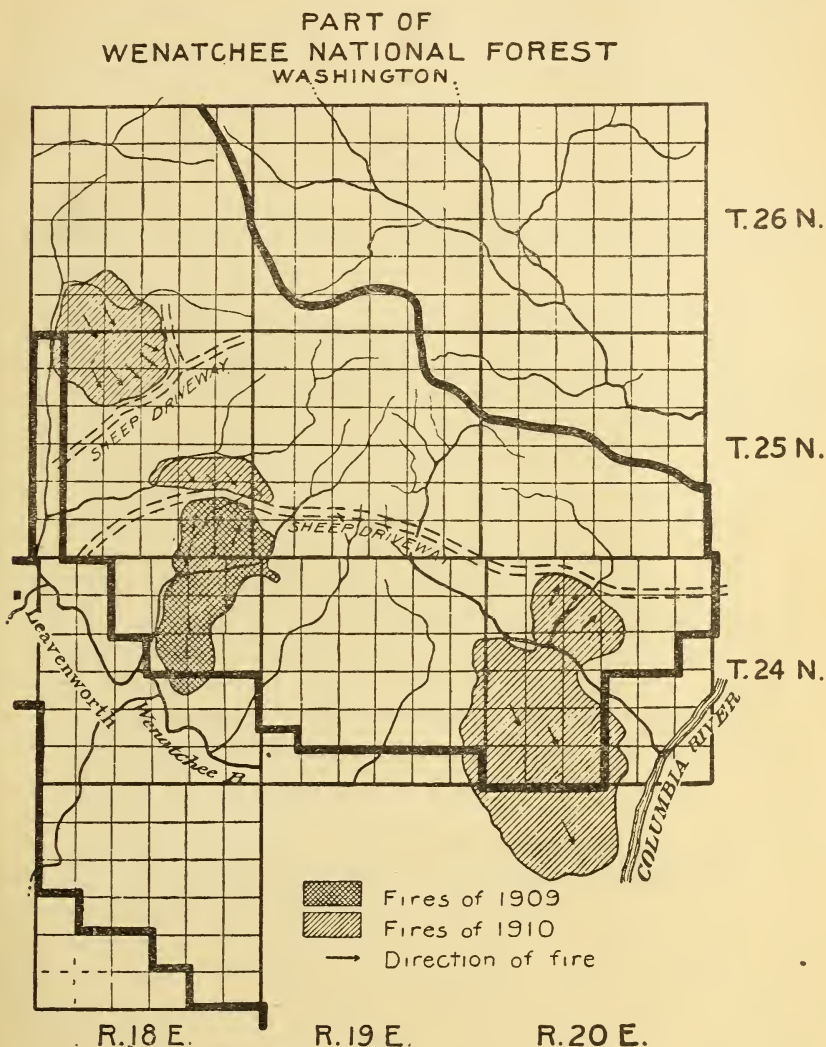


FIG. 1.—Fires stopped by sheep driveways.

One of the principal conditions in the approval of grazing applications is a clause under which the permittee agrees to bind himself and his employees to use every precaution with fires and to assist in extinguishing them upon and in the vicinity of his allotment. The grazing privilege has become so valuable that stockmen can not afford to have their permits canceled for any breach of the agree-

ment, and this, together with the deterring influence of strict State and national fire laws, has had its effect in rapidly reducing to a minimum the fires which may be attributed to the presence of stockmen on the Forests.

The fact of the awakened or changed public sentiment with reference to forest fires, as it relates to the West, also must not be overlooked. While with a very small number of stockmen, largely among the more illiterate class of Mexican herders, there is a lingering belief in the idea that it is a good thing to burn off the ranges in the fall, there are few who now hold that the ranges can be benefited by this process. The large majority are unanimous in the belief that burning results in harm rather than benefit, and have for some time opposed all burning. Valuable feed is destroyed by the burning, and the permanent carrying capacity of the ranges lessened. In most cases it requires from one to three years or more for a range to recover from a severe burn, and during the interval the amount of forage produced is much lessened. Valuable weeds seldom recover from severe burns until after several years, if ever. In the mountains of the West it may be confidently stated that burning is not necessary to improve the range. It is an injury rather than a benefit. Grass, moreover, has become valuable and must be husbanded, and any kind of cleaning process which will deprive the stock of feed, even temporarily, results in distinct economic loss to the stockmen.

So the advantages of having the grazing permittees and their employees on the Forests during the fire season far outweigh the disadvantages. In fully 90 per cent of the cases stockmen or their employees render valuable service in putting out small fires, and are available with men, supplies, and equipment for larger fires. The question arises: How may *more* use be made of the grazing permittees?

It is suggested that some plan be inaugurated on each Forest which will give official and honorable mention to stockmen or their employees who render independent service, similar to the plan now in effect in some sections of giving sheep herders who have been especially diligent in observing the grazing regulations a card commending them to other sheep employers. Special letters of appreciation could be sent out by the district forester. Local newspaper publicity could also be given to noteworthy cases. Ordinary cooperation which stockmen agree to in their applications should not be thus recognized, but those things which stand out like the following instances, which are of Service record:

"Two herders saved the day in the case of one fire."

"Nine permittees fought fire 48 hours without recompense."

"A herder took up the patrol of a regular ranger during the latter's illness."

"One permittee came 30 miles and fought 100 hours without rest and said he expected no pay for his services."

The regular fire plans should take into account not only the ranches in and adjacent to the Forests, but should also include the temporary summer camps so as to make the greatest possible use of these men and their equipment. The protective force of approximately 2,500 men can thus be augmented by fully 25,000 persons, more or less available for fire duty in emergencies.

CONCLUSIONS.

Recognizing the value of normal grazing in fire protection of timberlands, a study of its application to the National Forests suggests:

(1) The timely use of present ranges or the removal of rank vegetation before it becomes unpalatable.

(2) The utilization of all suitable unused lands by the development of water and trails and the elimination or control as rapidly as possible of all factors which prevent present use.

(3) The closer consideration of the class of stock to be grazed where fire protection is involved.

(4) The location of driveways and trails so as to form the most efficient fire lines and means of communication.

(5) The overgrazing of strategic points. Minor damage at such points may result in saving large areas of forest from destruction by fire.

(6) The study of lightning fires on the Forests with a view to determining whether lightning zones exist and whether grazing may be made to assist in preventing the spread of fire.

(7) The fuller enlistment of the moral and active support of some 25,000 additional persons in the Forests on account of grazing uses.

(8) The closer correlation of the live-stock industry of the Forests with the fire-protection plans.

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